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SERIOUS COMPLICATIONS OF SUPPURATION OF THE MIDDLE EAR

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It is not so very long ago that purulent processes in the ear, no matter whether they were acute or chronic, were almost disregarded by otherwise well-informed physicians. Who does not remember having heard such remarks as "not to meddle with the ear," or "that suppuration was nature's own way to get rid of offending material," etc. ? And this in an age when the dawn of modern surgery with its brilliant achievements had spread to almost the remote corners of the earth ! Is it strange, then, that there was a time when in cases where suppurative inflammations of the brain or its meninges were found associated with purulent middle-ear disease, the relation between cause and effect was thoroughly misunderstood ? It was thought that the inflammation in the ear was the complication by extension of disease in the cerebral cavity downward, in an attempt to evacuate pus through this organ. However, anatomical and pathological investigations did not fail to clear the views regarding this question. Yet it remained for the application of modern surgical methods to show the true relation of cause and effect, and to

Presented by the author

point out a way for the treatment of affections which had been considered hopelessly beyond the reach of any save the most impotent treatment.

The last fifteen years have witnessed a most remarkable development in the study of ear diseases. Not alone were aural surgeons interested by this unprecedented progress, but equally so the surgeons, the neurologists, the pediatricians, and the general practitioners. This is due to the fact that the seriousness of purulent processes in the middle ear is now generally appreciated; their bearing upon the general health of the individual, and their great danger to life, are now universally understood. This latter point has most prominently been brought to light by numerous investigations made in large hospitals of different countries. It has been conclusively shown that in former years numberless patients died with such diagnoses as meningitis, typhoid fever, brain fever, marasmus (infantile and senile), eclampsia infantum, convulsions, intermittent fever, apoplexy, brain abscess, etc., whereas in reality they were victims of purulent middle-ear disease which had not been recognized.

It would lead me too far to go into a detailed statistical account of the percentage of deaths from ear affections in reference to all other causes, as well as in reference to the number of people who suffer from suppuration of the middle ear. Suffice it to say that autopsies made in large hospitals upon the bodies of *all* who died, have uniformly demonstrated the comparatively large percentage of ear diseases as a cause of death. Among other facts, this has been established with certainty, that at least one-third, and probably one-half, of all brain abscesses are of otitic origin, while almost two-thirds of all cases of phlebitis of the sinuses are due to diseases of the ear and the temporal bone.

The ways in which ear disease may be transmitted to the cranial cavity are readily understood, if we recollect the anatomical conditions of the tympanic cavity. The inner (medial) wall is formed by the osseous wall of the labyrinth with the round and oval window, above which the facial nerve in its canal, and the external semicircular canal are located. In this place there is often caries. Suppuration can readily pass into the labyrinth, or into the facial canal, and from here into the cranial cavity. The anterior wall is in close proximity to the carotid interna. This wall is perforated by one or two canaliculi carotico-tympanici. The posterior wall contains the entrance opening to the mastoid antrum and to the mastoid cells. These latter are again in the immediate neighborhood of the lateral sinus. The upper wall forms the roof of the tympanic cavity, and is, together with the roof of the antrum, part of the floor of the middle cerebral fossa. This plate of bone is often as thin as tissue paper, and has frequently small perforations. The lower wall forms the roof of the jugular fossa, and separates the tympanic cavity from the bulbus of the jugular vein. The outer wall, formed by the drum-head, is therefore the only one not in direct contact with important organs.

These anatomical conditions offer, as will be easily understood, open gates for the entrance of infectious matter to the adjacent important organs. The avenues of infection are either the bone itself, by being involved, by the suppuration, in the pathological process; or the suppuration is propagated into the neighboring structures through preëxisting roads, along the blood-vessels, nerves, lymphatics, or dehiscences in the bone, which are not at all uncommon. Any impediment to a free escape of pus from the tympanic cavity is in many cases directly responsible for the propagation of the infection into the cranial cavity,

Among the more serious complications of purulent middle-ear disease must first be mentioned caries and necrosis of the temporal bone. This may occur in acute suppuration, but is more frequently found during a chronic otitis media purulenta. The infectious diseases are known to be often associated with or followed by carious processes in the organ of hearing.

Necrosis is not so common as caries, although it occurs relatively more frequently in children. The mastoid process is often involved in the suppuration of the middle ear; we find acute inflammation of the mastoid cells with or without mastoid periostitis; and caries and necrosis of smaller or larger portions of the mastoid process. These may in turn lead again to cerebral complications. On the other hand the peculiar topographical relations between the mastoid antrum and mastoid cells on the one side, and the tympanic cavity on the other, both being connected by a very narrow opening situated high above the lowest point of the mastoid cavities, explain it, why pus accumulating in the mastoid antrum burrows, in some cases, its way through the tip of the apophysis and descends downward below and between the long muscles and vessels of the neck. In such cases the pus may find its way either into the pharynx, or into the mediastinum.

As the result of chronic suppuration, and usually combined with caries, soft masses are sometimes found to occupy the tympanic cavity, the antrum, and occasionally the mastoid cells. These are the so-called cholesteatoma, that much discussed and thoroughly destructive accumulation of epithelial masses. That partial or complete deafness, paralysis of the facial nerve, and disturbances of the equilibrium, may accompany or follow these occurrences is well known.

More serious, however, are the cerebral complications, which unfortunately terminate so often fatal-

ly, although of late years enormous advances have been made in the operative treatment of such cases, leading in a number of instances to a cure. It is gratifying to state that the technique of these operations has been perfected so much, and the indications for operative interference are being more clearly defined from year to year, that there is sufficient reason to believe that in coming years many cases will be saved by operation which as yet offer scarcely any chance for recovery. These complications are pachymeningitis purulenta externa, or extradural abscess, if the infectious masses find their way between the bone and the dura mater; if they perforate the dura mater, pachymeningitis interna and leptomeningitis purulenta will result; and if they enter the brain by way of connective tissue extensions, or blood-vessels, an abscess of the brain will be the outcome. Furthermore, by extension of the inflammation through the thin bony partition walls into the adjacent veins and sinuses, thrombosis and phlebitis of these blood-vessels are established. Thus, we find thrombosis of the lateral sinus and the jugular vein, and, though more rarely, of the superior and inferior petrosal and the cavernous sinuses. The phlebitis of the sinuses again may lead to general pyemia and septicemia. Finally, erosion of the coats of the carotid artery, the lateral sinus, or the bulb of the jugular vein has, although extremely rarely, caused fatal hemorrhage. And it is also a well-established fact that localized and general tuberculosis may develop from a purulent otitis media in individuals heretofore free from any tuberculous infection.

In addition, I desire to recall to you the fact that chronic suppuration of the middle ear may, without producing any cerebral or other local complications, be the cause of a continued general cachexia, leading sometimes to a fatal issue. Or, during the course of purulent

inflammations, symptoms of meningeal irritation may repeatedly arise, which, if not relieved, will be the forerunner of more serious complications. It may be well to state also that fatal meningitis has occasionally followed cases where the exudation was serous, sometimes without even perforating the drumhead.

In the limited time allotted to me I could only sketch in hasty outlines the principal points of this vast and most important subject, reserving a more detailed account of some of these affections, and the consideration of the prophylaxis and treatment of these serious complications for another occasion. But above all we must place the prophylaxis. We should never forget that Wilde's words stand yet undisputed "that we never can say where or when an otorrhea will end, or to what it may lead." While it is true that modern surgery has progressed enormously, so far indeed as to often save through an operation the life of a patient almost beyond the hope of recovery, it will be much more to the credit of the profession if these operations would become less and less necessary; and this goal can only be reached if the physicians at large, and not only the otologists, would become imbued with the importance of all exudative troubles, if they will remember that there is no spot in the human body where the retention of an insignificant amount of pus may lead to such serious complications, and if they will see that every case of suppuration of the middle ear receives an early and appropriate treatment.

